

REMARKS

Claims 1-30, 35-37, and 39-41 are pending in the application. Reconsideration and withdrawal of the rejections are requested in view of the following remarks.

The claims are directed to methods for cleaning a flat media workpiece, wherein a liquid jet (or jet of steam) is directed through a heated liquid boundary layer on the surface of the workpiece to physically dislodge contaminants from the workpiece. The boundary layer liquid, and the liquid of the jet, may be the same liquid, or different liquids. Ozone is provided into the environment around the workpiece. The ozone diffuses through the boundary layer to react at the workpiece surface. The chemical reaction between the ozone and organic contaminants removes the contaminants. Thus, the claimed methods provide an improved process for cleaning a workpiece, involving both reaction of ozone at the workpiece surface, and physical removal of contaminants from the workpiece via a liquid jet directed through a heated liquid boundary layer.

Turning to the § 103 rejections at pp. 2-3 of the Office Action, none of the cited references teach directing a liquid jet (or jet of steam) through a heated liquid boundary layer on a workpiece to physically dislodge/remove a contaminant from the workpiece, as recited in independent claims 1, 25, and 35. Matsuoka is the only reference cited as teaching that a liquid is "jetted" onto a workpiece surface. Matsuoka, however, does not teach or suggest the step of directing a liquid jet (or jet of steam) through a liquid boundary layer to physically dislodge/remove a contaminant from a workpiece.

Rather, Matsuoka teaches that ultra-pure water is "jetted" through a nozzle toward a substrate on a rotating table so that thin films of ultra-pure water are formed

on the surface of the substrate (p. 5, lines 26-28). Thus, Matsuoka teaches that ultra-pure water is jetted onto a workpiece surface to form a liquid boundary layer, not to penetrate or pass through an already-present liquid boundary layer. The claimed methods, conversely, recite that a heated liquid boundary layer is first formed on the workpiece, and a liquid jet (or jet of steam) is then directed through the boundary layer to physically dislodge contaminants from the workpiece.

Moreover, referring to Figs. 1-3 of Matsuoka, if the water were jetted at a high enough pressure to dislodge contaminants, the water would likely deflect off of the substrate surface or the liquid boundary layer, and not through the liquid boundary layer, as claimed, because the spray angle is nearly parallel to the workpiece surfaces. Thus, in Matsuoka, the term "jetted," which is not defined or explained, clearly refers to something that is very different from the claimed liquid jet (or jet of steam), and Matsuoka does not contemplate or suggest directing a liquid jet through a heated liquid boundary layer to physically dislodge contaminants from a workpiece, as claimed.

Furthermore, Matsuoka does not teach the step of physically dislodging contaminants from the workpiece with a liquid jet, as claimed. Paragraph 7 of the Office Action states that "physically dislodging" is inherent in Matsuoka. Matsuoka, however, does not teach or suggest, explicitly or inherently, the use of a jetted liquid to physically dislodge contaminants from a workpiece. Rather, Matsuoka teaches only a method of chemically treating a workpiece with an ozone-containing solution to remove an organic coating from the workpiece.

In the method taught by Matsuoka, ultra-pure water is sprayed onto a workpiece surface, in an ozone-containing gas atmosphere, to form a thin liquid film thereon (see

Example 1 and claim 1). The ozone gas dissolves into the liquid film and reacts at the workpiece surface to remove contaminants (p. 3, lines 2-5). The additional claimed step of directing a liquid jet through the liquid boundary layer to physically dislodge contaminants from the workpiece surface is not taught or suggested in Matsuoka. Indeed, Matsuoka does not even teach or suggest aiming a nozzle at a workpiece in an orientation that would allow the directing of a liquid jet through the liquid film on the workpiece surface (see Figs. 1-3, showing nozzles 9 oriented substantially parallel to the workpiece surfaces).

Furthermore, there is no step performed in Matsuoka that “inherently” physically dislodges contaminants from the workpiece. Indeed, no liquid jet, or any other form of liquid, is directed through the liquid film on the workpiece. Rather, the only liquid directed to the workpiece in Matsuoka is the liquid used to form the liquid film, and no liquid jet is directed through that liquid film to physically dislodge contaminants. Thus, Matsuoka does not teach or suggest the claimed methods. None of the other cited references teach or suggest the claimed step of directing a liquid jet through a boundary layer to physically dislodge/remove contaminants from a workpiece. Accordingly, all of the claims are believed to be in condition for allowance.

With respect to claims 3 and 4, none of the cited references teach or suggest pressurizing a liquid jet to a pressure of 100-15,000 psi, or 400-800 psi, as claimed. Such high pressures facilitate the physical removal of contaminants with a liquid jet. Thus, claims 3 and 4 include additional steps for removing contaminants that are not taught or suggested by the prior art.

Regarding claim 22, a jet diameter of 0.5-10 mm is clearly patentably distinct from a "spray," because a "spray," as taught in Matsuoka, has no diameter. In Matsuoka, the spray simply expands outwardly from the nozzle 9 (see Figs. 1-3). Thus, claim 22 includes an additional step for removing contaminants that is not taught or suggested by the prior art.

Additionally, all of the claims include the use of a heated liquid and/or a heating step. Matsuoka expressly teaches away from heating (see p. 3, lines 34-35; p. 4, lines 33-34; Example 1 on page 5; and Comparative Example 1 on page 6), and no heater is disclosed in Matsuoka. Thus, it is improper to combine the teachings of Matsuoka with those of a reference that teaches heating, such as JP '927. Accordingly, the cited references, alone or in combination, do not teach or suggest the claimed methods.

In view of the foregoing, it is submitted that the claims are in condition for allowance, and a Notice of Allowance is requested.

Dated: Feb. 11, 2004

Respectfully submitted,

Customer No. 34055
Perkins Coie LLP
Patent - LA
P.O. Box 1208
Seattle, WA 98111-1208
Phone: (310) 788-9900
Fax: (310) 788-3399

PERKINS COIE LLP

By: Kenneth H. Ohriner
Kenneth H. Ohriner
Reg. No. 31,646